APPENDIX: A FLOODPLAINS AND WETLANDS ASSESSMENT FOR THE POTENTIAL EFFECTS OF THE LOS ALAMOS CANYON GAS LINE

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Title	**A Floodplains and Wetlands Assessment for the Potential Effects of the Los Alamos Canyon Gas Line**
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CONTENTS

Figures

A Floodplains and Wetlands Assessment for the Potential Effects of the Los Alamos Canyon Gas Line

Summary

The Department of Energy proposes to construct the Los Alamos Canyon Gas Line (LAGL) on Los Alamos National Laboratory property starting during the 2002-2003 fiscal years. The Public Service Company of New Mexico will conduct the actual construction of this line. This assessment documents potential impacts of the floodplains and wetlands associated with the area. Site-specific best management practices are included to ensure that impacts do not occur to floodplains and wetlands that may exist in the area of the proposed construction site. No potential loss of life or property has been identified with respect to the floodplains and wetlands for the proposed project. Concerns about siltation, erosion, and excessive storm water runoff will be addressed with specific mitigation implemented as part of careful project planning. Although there may be some effect to floodplains and wetlands, the potential impacts from the LAGL project are expected to be minor.

1.0 Proposed Action

The NNSA U.S. Department of Energy (DOE) proposes to grant an easement to the Public Service Company of New Mexico (PNM) for the construction and operation of a new 30-cm (12-in.) gas line on Los Alamos National Laboratory (LANL). PNM will conduct the actual construction of the Los Alamos Canyon Gas Line (LAGL). PNM will follow LANL/DOE regulations and requirements during the LAGL construction on LANL/DOE property. This project is located in Technical Areas (TA) 53, TA-21, TA-73, and TA-72 in the central portion of LANL in Los Alamos Canyon. The construction of this line is scheduled to begin in fiscal years 2002-2003. The proposed construction will consist of trenching along the canyon bottom, mostly along an existing electric utility corridor. The project area will be approximately 4.5 km (3.0 mi) long and 15 m (50 ft) wide. The project area, in sensitive spotted owl habitat, will be approximately 1.43 km (0.90 mi). The average width of the disturbance will be approximately 15 m (50 ft). There will be no removal of vegetation or rock features on the slopes of Los Alamos Canyon as a result of this project. The proposed line will be placed under the canyon streambed through directional drilling rather than being placed on the surface. The LAGL will provide additional capacity for future regional growth, add redundancy to existing gas supplies, and replace the existing 20.6-cm (8.1-in.) high-carbon steel pipeline that is located under State Highway 502. The existing pipeline is over 50 years old, is a nonstandard size, is difficult to weld and work on, and has reduced impact strength compared to modern pipe because of the high carbon content.

2.0 Environmental Baseline

2.1 Regional Description

2.1.1 Location within the State

LANL and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, north-central New Mexico, approximately 100 km (60 mi) north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe (Figure 1). The 11,596-ha (28,654-ac) LANL site is situated on the Pajarito Plateau. This plateau is a series of finger-like mesas separated by deep east-to-west-oriented canyons cut by intermittent streams. Mesa tops range in elevation from approximately 2,400 m (7,800 ft) on the flanks of the Jemez Mountains to about 1,900 m (6,200 ft) at their eastern termination above the Rio Grande.

Most LANL and community developments are confined to mesa tops. The surrounding land is largely undeveloped. Large tracts of land north, west, and south of the LANL site are held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The Pueblo of San Ildefonso borders LANL to the east.

2.1.2 Geologic Setting

Most of the finger-like mesas in the Los Alamos area are composed of Bandelier Tuff, which consists of ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 300 m (1,000 ft) thick in the western part of the plateau and thins to about 80 m (260 ft) eastward above the Rio Grande (Broxton et al., 1995). It was deposited after major eruptions in the Jemez Mountains Volcanic Field about 1.2 to 1.6 million years ago (Self and Sykes 1996).

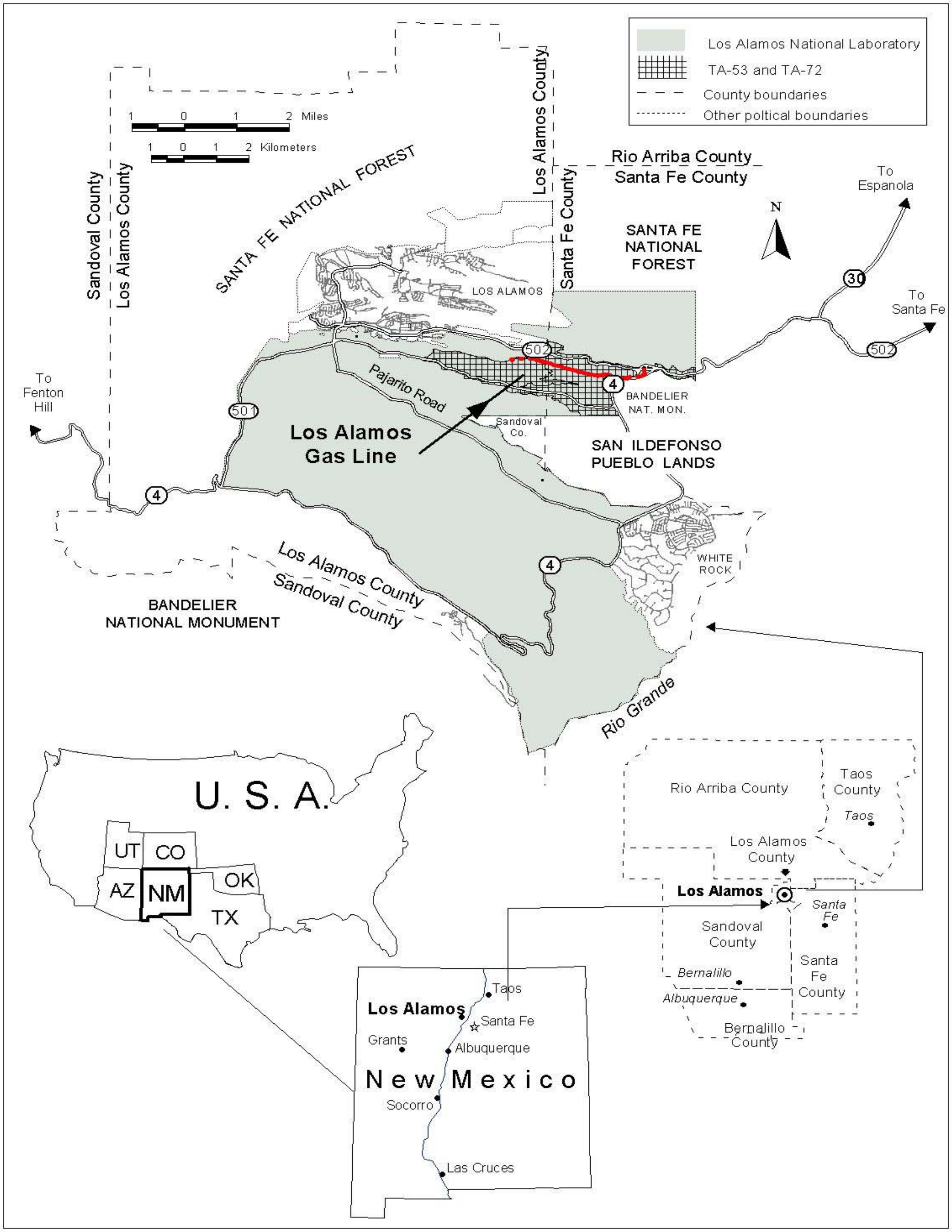

Figure 1. Location of Los Alamos National Laboratory and the area of the LAGL project.

On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains (Self and Sykes 1996). The conglomerate of the Puye Formation underlies the tuff in the central plateau and near the Rio Grande. Chino Mesa basalts interfinger with the conglomerate along the river. These formations overlay the sediments of the Santa Fe Group, which extend across the Rio Grande valley and are more than 1,000 m (3,300 ft) thick. LANL is bordered on the east by the Rio Grande, within the Rio Grande rift. Because of the faulting associated with the rift, the area experiences frequent minor seismic disturbances.

Surface water in the Los Alamos area occurs primarily as short-lived or intermittent reaches of streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into the upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the LANL site before they are depleted by evaporation, transpiration, and infiltration (DOE 1999). Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande several times a year in some drainages. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances.

Groundwater in the Los Alamos area occurs in three forms: (1) water in shallow alluvium in canyons, (2) perched water (a body of groundwater above a less permeable layer that is separated from the underlying main body of groundwater by an unsaturated zone), and (3) the main aquifer of the Los Alamos area. Ephemeral and intermittent streams have filled some parts of canyon bottoms with alluvium that ranges from less than 1 m (3 ft) to as much as 30 m (100 ft) in thickness. Runoff in canyon streams percolates through the alluvium until its downward movement is impeded by layers of weathered tuff and volcanic sediment that are less permeable than the alluvium. This process creates shallow bodies of perched groundwater that move downgradient within the alluvium. As water in the alluvium moves down the canyon, it is depleted by evapotranspiration and movement into underlying volcanics (Purtymun et al., 1977). The chemical quality of the perched alluvial groundwaters shows the effects of discharges from LANL.

In portions of Pueblo, Los Alamos, and Sandia canyons, perched groundwater occurs beneath the alluvium at intermediate depths within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalts. Perched groundwater has been found at depths of about 37 m (120 ft) in the midreach of Pueblo Canyon to about 137 m (450 ft) in Sandia Canyon near the eastern boundary of LANL (Purtymun 1995a). This intermediate-depth perched water discharges at several springs in the area of Basalt Spring in Los Alamos Canyon. These intermediate-depth groundwaters are formed in part by recharge from the overlying perched alluvial groundwaters and show evidence of radioactive and inorganic contamination from LANL operations (Purtymun 1995a).

Perched water may also occur within the Bandelier Tuff in the western portion of LANL, just east of the Jemez Mountains. The source of this perched water might be infiltration from streams discharging from the mouths of canyons along the mountain front and underflow of recharge from the Jemez Mountains. Industrial discharges from LANL operations may also contribute to perched groundwater in the western portion of LANL. Perched groundwater in the Tschicoma Formation is the source of water supply for the ski area located just west of the LANL boundary in the Jemez Mountains.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply (Griggs 1964). The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group) into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth to the main aquifer is about 300 m (1,000 ft) beneath the mesa tops in the central part of the plateau. The main aquifer is separated from alluvial and perched waters by about 110 to 190 m (350 to 620 ft) of tuff and volcanic sediments with low (less than 10 percent) moisture content (Griggs 1964).

Water in the main aquifer is under artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johnson 1974). The source of recharge to the aquifer is presently uncertain. Early research studies concluded that major recharge to the main aquifer is probably from the Jemez Mountains to the west because the piezometric surface slopes downward to the east, suggesting easterly groundwater flow beneath the Pajarito Plateau (Purtymun 1995b). However, the small amount of recharge available from the Jemez Mountains relative to water supply pumping quantities, along with differences in isotopic and trace element composition, appear to rule this out. Further, isotopic and chemical composition of some waters from wells near the Rio Grande suggest that the source of water underlying the eastern part of the Pajarito Plateau may be the Sangre de Cristo Mountains (Blake et al., 1995).

Groundwater flow along the Rio Grande rift from the north is another possible recharge source. The main aquifer discharges into the Rio Grande through springs in White Rock Canyon. The 18.5-km (11.5-mi) reach of the river in White Rock Canyon between Otowi Bridge and the mouth of Rio de los Frijoles receives an estimated 5.3 to 6.8×10^6 m^3 (4,300 to 5,500 acre-ft) annually from the aquifer (Griggs 1964).

2.1.3 Topographic Setting

LANL and its surrounding environments encompass a wide range of environmental conditions. This is due in part to the prominent elevational gradient in the east-west direction. This is also attributable to the complex, local topography that is found throughout much of the region.

The spectacular scenery that is a trademark of the Los Alamos area is largely a result of this regional gradient. The difference between its lowest elevation in the eastern extremities and its highest elevation on the western boundaries represents a change of approximately 1,568 m (5,146 vertical feet). At the lowest point along the Rio Grande, the elevation is approximately 1,631 m (5,350 ft) above mean sea level. At the opposite elevational extreme, the Sierra de los Valles, which is part of the more extensive Jemez Mountains, forms a continuous backdrop to the landscapes of the region being studied. The tallest mountain peaks in the Sierra include Pajarito Mountain at 10,441 ft (3,182 m), Cerro Rubio at 10,449 ft (3,185 m), and Caballo Mountain at 10,496 ft (3,199 m).

In addition to the prominent elevational gradient, the Los Alamos region is also topographically complex. Within Los Alamos County, there are three main physiographic systems (Nyhan et al., 1978). From east to west, these systems are the White Rock Canyon, the Pajarito Plateau, and the Sierra de los Valles. White Rock Canyon is 1,890 m (6,200 ft) above mean sea level. This rugged canyon is approximately 1.6 km (1 mi) wide and extends to a depth of nearly 275 m (900 ft). White Rock Canyon occupies about 5 percent of Los Alamos County. The Pajarito Plateau is the largest of the three physiographic systems, occupying nearly 65 percent of Los Alamos County. The Pajarito

Plateau is a broad piedmont that slopes gently to the east and southeast. At a more localized scale, the Pajarito Plateau is also topographically complex. The surface of the plateau is dissected into narrow mesas by a series of east-west-trending canyons. Above 2,377 m (7,800 ft), the Sierra de los Valles rises to the western extremity of the study region. These mountains occupy approximately 30 percent of Los Alamos County. The Sierra is also dissected into regularly spaced erosional features, although these canyons in the mountains are not so prominent as the canyons on the Pajarito Plateau.

2.1.4 Weather and Climate

Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area because of the topography.

Los Alamos has four distinct seasons. Winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Spring is the windiest season of the year. Summer is the rainy season in Los Alamos, when afternoon thunderstorms and associated hail and lightning are common. Fall marks the end of the rainy season and a return to drier, cooler, and calmer weather. The climate statistics discussed below summarize analyses given in Bowen (1990 and 1992).

Several factors influence the temperature in Los Alamos. An elevation of 2,256 m (7,400 ft) helps to counter its southerly location, making for milder summers than nearby locations with lower elevations. The sloping nature of the Pajarito Plateau causes cold-air drainage, making the coolest air settle into the valley. The Sangre de Cristo Mountains to the east act as a barrier to arctic air masses affecting the central and eastern United States. The temperature does occasionally drop well below freezing, however. Another factor affecting the temperature in Los Alamos is the lack of moisture in the atmosphere. With less moisture, there is less cloud cover, which allows a significant amount of solar heating during the daytime and radiative cooling during the nighttime. This heating and cooling often causes a wide range of daily temperature.

Winter temperatures range from 30°F to 50°F (-1°C to 10°C) during the daytime to 15°F to 25°F (-9°C to -4°C) during the nighttime. The record low temperature recorded in Los Alamos (as of 1992) is -18°F (-28°C). Winter is usually not particularly windy, so extreme wind chills are uncommon at Los Alamos. Summer temperatures range from 70°F to 88°F (21°C to 31°C) during the daytime to 50°F to 59°F (10°C to 15°C) during the nighttime. Temperatures occasionally will break 90°F (32°C). The highest temperature ever recorded (as of 1992) in Los Alamos is 95°F (35°C).

The average annual precipitation in Los Alamos is 47.57 cm (18.73 in.). The average snowfall for a year is 149.6 cm (58.9 in.). Freezing rain and sleet are rare at Los Alamos. Winter precipitation in Los Alamos is often caused by storms entering the United States from the Pacific Ocean, or by cyclones forming or intensifying in the lee of the Rocky Mountains. When these storms cause upslope flow over Los Alamos, large snowfalls can occur. The snow is usually a dry, fluffy powder, with an average equivalent water-to-snowfall ratio of 1:20.

The summer rainy season accounts for 48 percent of the annual precipitation. During the July–September period, orographic thunderstorms form when moist air from the Gulf of Mexico and the Pacific Ocean moves up the sides of the Jemez Mountains. These thunderstorms can bring large downpours, but sometimes they only cause strong winds and lightning. Hail frequently occurs from these rainy-season thunderstorms.

Winds in Los Alamos are also affected by the complex topography, particularly in the absence of a large-scale disturbance. There is often a distinct daily cycle of the winds around Los Alamos. During the daytime, upslope flow can produce a southeasterly wind on the plateau. In the evening, as the mountain slopes and plateau cool, the flow moves downslope, causing light westerly and northwesterly flow. Cyclones moving through the area disturb and override the cycle. Flow within the canyons of the Pajarito Plateau can be quite varied and complex.

2.1.5 Plant Communities

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 5,000-ft (1,500-m) elevation gradient from the Rio Grande on the east to the Jemez Mountains 20 km (12 mi) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County: juniper (*Juniperus monosperma*)-savanna, piñon (*Pinus edulis*)-juniper, ponderosa pine (*Pinus ponderosa*), mixed conifer, and spruce-fir All of the communities and their distribution are cited in Balice (1998). The juniper-savanna community is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons at elevations between 1,700 to 1,900 m (5,600 to 6,200 ft). The piñon-juniper cover type, generally in the 1,900- to 2,100-m (6,200- to 6,900-ft) elevation range, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pines are found in the western portion of the plateau in the 2,100- to 2,300-m (6,900- to 7,500-ft) elevation range. These three cover types predominate, each occupying roughly one-third of the LANL site. The mixed conifer cover type, at an elevation of 2,300 to 2,900 m (7,500 to 9,500 ft), overlaps the ponderosa pine community in the deeper canyons and on north-facing slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. Spruce-fir is at higher elevations of 2,900 to 3,200 m (9,500 to 10,500 ft). Twenty-seven wetlands and several riparian areas enrich the diversity of plants and animals found on LANL lands.

2.1.6 Post-Fire Plant Communities

In May 2000, the Cerro Grande Fire burned over 43,000 acres of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. An assessment of fire-induced vegetation mortality was made by the Burned Area Emergency Rehabilitation Team (BAER 2000) and is discussed for threatened and endangered species in the Los Alamos Canyon Gas Line Biological Assessment (Keller 2002). Some vegetation was burned in floodplains, but not in wetlands.

2.1.7 Pre- and Post-Fire Hydrology

McLin (1992) modeled all major 100-year floodplains for LANL using U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-1 and HEC-2 computer-based models. These data represent pre-fire flow rates for all of the floodplains on LANL. Post-fire analyses have been completed (McLin et al., 2001). Figure 2 shows the extent of the current floodplain in Los Alamos Canyon.

3.0 Project Description

3.1 Project Area

All activities associated with this project will occur on LANL property (see Figure 1).

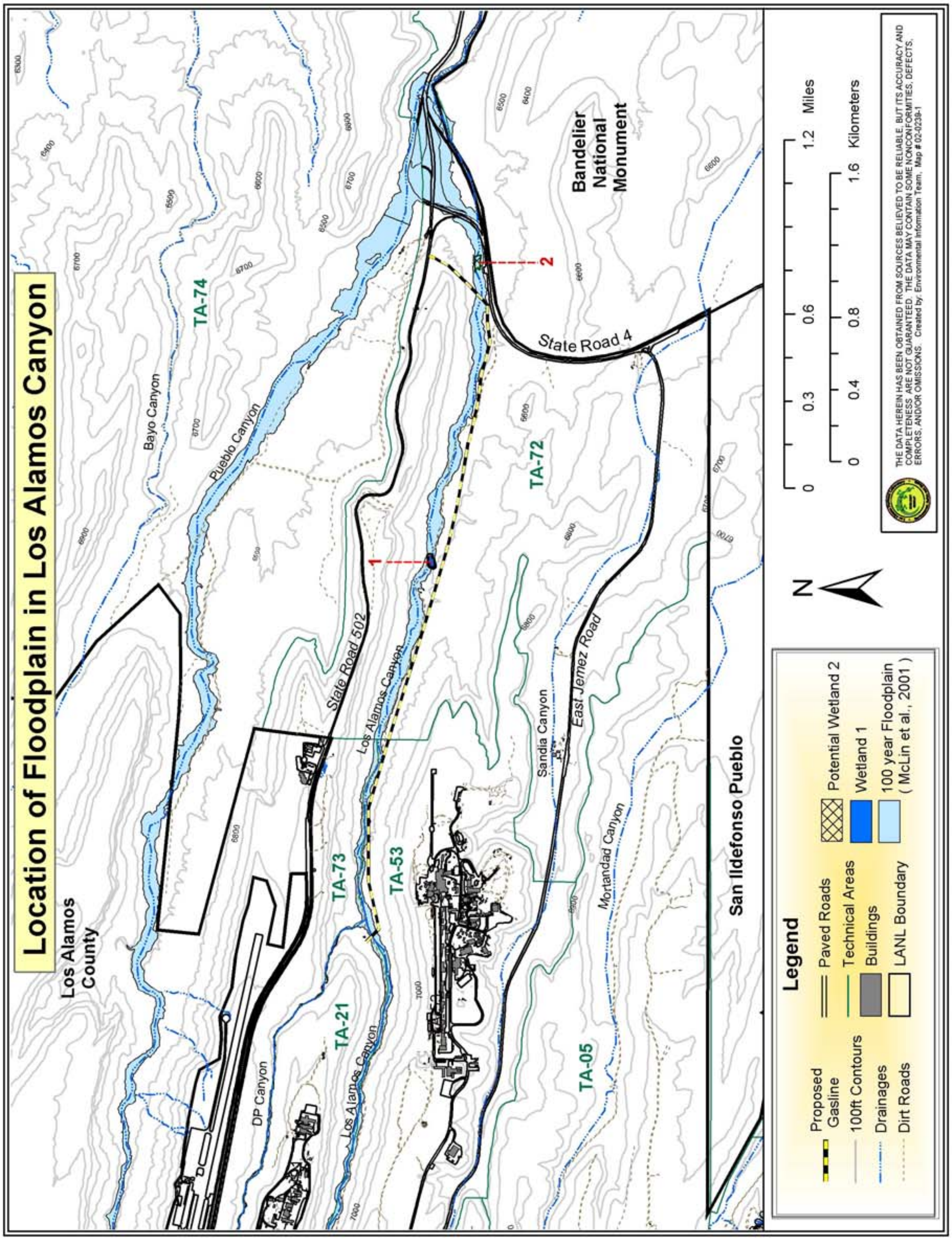

Figure 2. Extent of floodplains and wetlands within the project area.

The LAGL will consist of a trench and an easement 15 m (50 ft) wide along a majority of the route. Disturbed areas left by the trenching of the proposed LAGL will be restored and re-vegetated following the completion of the project. An access road (3 m [10 ft] wide) will remain within the easement and be maintained by PNM

This new construction will be mostly adjacent to an existing electrical power line. During construction, a loss of up to 7.0 ha (17.5 ac) of habitat could occur. Approximately 5 percent of the proposed project area is disturbed; 100 percent of the proposed project area is suitable for use by foraging wildlife.

3.1.1 Location

The proposed LAGL will be located in the central portion of the Laboratory in TA-21, TA-53, TA-72, and TA-73. This gas line will be trenched up Los Alamos Canyon. The proposed project will not remove canyon slope habitat or cross the canyon streambed above the ground surface.

3.1.2 Elevation

The proposed LAGL project will be approximately 4.5 km (3 mi) long, will begin at TA-53 at an elevation of 2,018 m (6,620 ft), and will proceed to the eastern end of Los Alamos Canyon of TA-72 at an elevation of 1,926 m (6,320 ft).

3.1.3 Plant Communities

The project area is 51 percent ponderosa pine forest, 40 percent piñon-juniper woodland, 6 percent bare soil, and 3 percent mixed conifer forest. None of the project area was burned in the Cerro Grande Fire. The gas line route will be almost exclusively in ponderosa pine with the eastern portion of the project area in piñon-juniper habitat. The only mixed conifer habitat, Douglas fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*), in the project area is on the north-facing slope of the canyon and will not be removed. The shrub layer of the area surrounding the site consists of Gamble's oak (*Quercus gambelii*), skunkbush sumac (*Rhus trilobata*), wild rose (*Rosa woodsii*), and New Mexico locust (*Robinia neomexicana*). The understory of the area surrounding the site consists of smooth brome (*Bromus inermis*), redtop (*Agrostis alba*), little blue stem (*Schizachyrium scoparium*), and blue grama (*Bouteloua gracilis*) grasses with hairy aster

(*Heterotheca villosa*), broom snakeweed (*Gutierrezia sarothrae*), and New Mexico lupine (*Lupinus neomexicanus*). Along the primary waterway through the bottom of the canyon are willow (*Salix exigna*), narrow leaf cottonwood (*Populus angustifolia*), and patchy areas of rush (*Juncus* sp.) and grasses.

3.1.4 Levels of Disturbance

The proposed LAGL project location is approximately 5 percent disturbed along the existing electrical line with the remainder of the location having a cover of native vegetation. Currently, the site consists of an electric power line at the edge of the proposed gas line route along most of its length with the remainder of the site having a scattered ponderosa pine woodland and native understory species. The site is mostly within the existing utility corridor for the high-power electric utility line, but the vegetation in this corridor is well developed with ponderosa pine up to about 20 cm (8 in.) in diameter.

4.0 Description and Effects on Floodplains and Wetlands

Pursuant to Executive Order 11988, Floodplain Management, each Federal agency is required, when conducting activities in a floodplain, to take actions to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. DOE's 10 CFR Part 1022.4 defines a flood or flooding as ". . . a temporary condition of partial or complete inundation of normally dry land areas from . . . the unusual and rapid accumulation of runoff of surface waters . . . ." DOE's 10 CFR Part 1022.4 identifies floodplains that must be considered in a floodplain assessment as the base floodplain and the critical-action floodplain. The base floodplain is the area inundated by a flood having a 1.0 percent chance of occurrence in any given year (referred to as the 100-year floodplain). The critical-action floodplain is the area inundated by a flood having a 0.2 percent chance of occurrence in any given year (referred to as the 500-year floodplain). Critical action is defined as any activity for which even a slight chance of flooding would be too great. Such actions could include the storage of highly volatile, toxic, or water-reactive materials.

Pursuant to Executive Order 11990, Protection of Wetlands, each Federal agency is to avoid, to the extent practicable, the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands if a practicable alternative exists. DOE 10 CFR Section 1022.4(v): Wetlands means those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds.

According to 10 CFR 1022.12(a)(2), a floodplain/wetland assessment is required to discuss the positive and negative, direct and indirect, and long- and short-term effects of the proposed action on the floodplain and/or wetlands. In addition, the effects on lives and property and on natural and beneficial values of floodplains must be evaluated. For actions taken in wetlands, the assessment should evaluate the effects of the proposed action on the survival, quality, and natural and beneficial values of the wetlands. If DOE finds no practicable alternative to locating activities in floodplains or wetlands, DOE will design or modify its actions to minimize potential harm to or in the floodplains and wetlands. The floodplains and wetlands that are assessed herein are those areas in canyons or drainages that are seasonally inundated with perennial or intermittent streams from runoff during 100-year floods.

4.1 General

Wetland functions are naturally occurring characteristics of wetlands such as food web production; general, nesting, resting, or spawning habitat; sediment retention; erosion prevention; flood and runoff storage; retention and future release; groundwater discharge or recharge; and land-nutrient retention and removal. Wetland values are ascribed by society based on the perception of significance and include water-quality improvement, aesthetic or scenic value, experiential value, and educational or training value. These values often reflect concerns regarding economic values; strategic locations; and in arid regions, the location relative to other landscape features. Thus, two wetlands with similar size and shape could serve the same function but have different values to society. For example, a wetland that retains or changes flood flow timing of a flood high in the mountains might not be considered as valuable as one of similar size that retains or changes flood-flow timing of a flood near a developed community. Wetlands were addressed in the LANL Site-Wide Environmental Impact Statement as follows (DOE 1999):

> "Wetlands in the general LANL region provide habitat for reptiles, amphibians, and invertebrates and potentially contribute to the overall habitat requirements of the peregrine falcon, Mexican spotted owl, southwestern willow flycatcher, and spotted bat. Wetlands also provide habitat, food, and water for many common species such as deer, elk, small mammals, and many migratory birds and bats. The majority of the wetlands in the LANL region are associated with canyon stream channels or are present on mountains or mesas as isolated meadows containing ponds or marshes, often in association with springs."

Wetlands within LANL have been broadly mapped by the U.S. Fish and Wildlife Service. This information is available in the National Wetlands Inventory in a Geographic Information System-based format. This hierarchical system follows Cowardin et al. (1979) and is based entirely on aerial photography. Small wetlands, or those in steep canyons, may not be detected using this method. Additional on-site surveys and internal University of California databases were also used to gather information regarding these resources.

Figure 2 shows the location of wetlands and riparian areas in Los Alamos Canyon. Wetland vegetation indicators exist throughout the stream reach for the canyon, particularly willow (*Salix exigna*), which is listed as an obligate on the National Wetlands Inventory plant list. However, in our region it behaves also as a facultative species. Another common riparian species with the willow is narrow leaf cottonwood (*Populus angustifolia*). Together these two species, along with areas of scattered grasses, mosses, and rushes, maintain the integrity of the streambed. In the area where pooling has led to seasonal wetland conditions, there is a greater density of willow (*Salix exigna*) and rushes (see Figure 2). Throughout this system, there is the potential for localized and scattered areas of hydric soils as are associated with intermittent stream systems. The Los Alamos

Canyon weir area is being monitored for the formation of a wetland. Signs of natural wetland formation are present, including hydric vegetation such as cattails and rushes. Willow (*Salix exigna*) and cottonwood (*Populus* sp.) have been planted by LANL staff to decrease soil erosion. The formation of a wetland in this area will depend upon future presence of wetland indicators.

Within the Los Alamos Canyon section there is discussion of the direct and indirect (both primary and secondary) effects of the proposed project on floodplain and wetlands resources located in the canyon. The effect of proposed floodplain actions on lives and property and on natural and beneficial floodplain values is evaluated.

4.2 Canyon Area Issues and Concerns

The canyon areas on LANL land are comprised primarily of mixed conifer and ponderosa pine. The majority of these canyons, especially in the northern region of LANL property, have been identified as core habitat for the Mexican spotted owl (Keller 2002).

Treatments in floodplains within habitat areas, such as potential habitat for the Mexican spotted owl, will follow the LAGL Biological Assessment (Keller 2002) and the actions agreed upon within the Threatened and Endangered Species Habitat Management Plan (HMP) (LANL 1998). In all cases, erosion, sediment transfer, and movement of contaminants are a concern, for work on mesa tops as well as within floodplains, particularly during rain events and the monsoon season.

Cumulative erosion of ash and soils from severely burned headlands above the project site is also a potential concern. The potential for downstream floodplain/wetland values to be impacted by the proposed project exists for the canyon. Potential downstream impacts are discussed for Los Alamos Canyon.

5.0 Canyon Specific Assessment

5.1 Los Alamos Canyon

5.1.1 Description

The primary tree cover for Los Alamos Canyon is mixed conifer in the upper sections and ponderosa pine for much of the length down to the lower elevations where it blends with piñon-juniper. There are wetlands associated with the canyon streambed, and the floodplain extends for the entire length. The headlands were severely burned, which may increase runoff during the monsoons. There is an established road running the entire length of the canyon.

5.1.2 Floodplains and Wetlands Description and Potential Impacts from Proposed Los Alamos Gas Line

Floodplains

The 100-year floodplain is illustrated in Figure 2.

Wetlands

There are scattered wetlands associated with this canyon (Figure 2). Wetland 1 (Fig. 2) shows signs of seasonal pooling associated with clustered dominant vegetation of willow (*Salix exigna*) and rush (*Juncus* sp.). Wetland 2 (Fig. 2) is a naturally developing potential wetland due to water pooling at the Los Alamos weir.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon, as long as previously approved best management practices are considered. Possible primary direct effects of the gas line project are a reduction in vegetation cover, exposure, and compaction of mineral soils due to excavation and heavy equipment. Possible secondary direct effects are the potential for the increase of erosion and storm water runoff.

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the gas line project have not been identified. If work conducted in Los Alamos Canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Best management practices for runoff control would be installed to minimize these impacts.

Secondary indirect impacts (outside of the project area) resulting from the gas line project would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio Grande). Downstream floodplain and wetland values potentially effected by the proposed gas line project could include a slight alteration of flood-flow retention times; a slight alteration of wildlife nesting, foraging, or resting habitat; a slight redistribution of sediments and sediment retention-time changes.

At a minimum, best management practices for runoff control, such as silt barriers, should be in place to mitigate runoff effects during the project. These best management practices would incorporate considerations of the National Pollutant Discharge Elimination System permit program and Environmental Protection Agency requirements for a Storm Water Pollution Prevention Plan and under sections 401 and 404 of the Clean Water Act.

6.0 Alternatives and Mitigations for the Proposed Project

6.1 Alternatives

There were a number of alternatives considered for the LAGL project. These include replacing the existing pipeline under SR 502, installing a pipeline in Pueblo Canyon, installing a pipeline under the existing gravel roadway in Los Alamos Canyon, and installing a pipeline in Sandia Canyon. All of these alternatives were dismissed for the following reasons: traffic disruption, floodplains and/or wetlands issues, increased costs, and no discernable improvements to the Proposed Action (for further details see DOE 2002).

The No Action Alternative, where the LAGL would not be constructed was also considered. Although no activity would be taken within the Los Alamos Canyon floodplain under this alternative, this action was dismissed on the grounds that natural gas service expansion is necessary for LANL, Los Alamos County, and surrounding communities.

6.2. Mitigations

In all cases, best management practices would be followed according to any and all DOE and LANL best management practices for wetlands and floodplains including the "Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration, Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory, Los Alamos, NM" (CSFS 1998, DOE 2000). All disturbed areas will be evaluated and improvements installed as needed. There may be some additional useful mitigation that is discussed below.

All work conducted for the proposed gas line project that involves the disturbance of soils through road building, the continuous use of roads, off-road vehicle use, dragging of debris, or trenching potentially contributes to an increase in sediment movement during a 100-year storm event. This in turn can possibly increase the amount of contaminants being relocated to downstream areas. Mitigation actions associated with activities in floodplains will in part depend upon best management practices already in place for potential release sites, erosion control, and post-gas line project mitigation.

In general, no debris would be left in the floodplains. This includes all downed vegetation. Care would be taken to keep all vegetation or soil from going into the watercourse. Leaving debris of any kind in a drainage, stream channel, or watercourse, even if it only runs seasonally, may invoke a penalty under Sections 401 and/or 404 of the Clean Water Act. Enough trees should remain along channel edges to stabilize the banks. Best management practices' suggestions from the Colorado Forest Stewardship Guidelines (CSFS 1998) include maintaining streamside management zones that are 15-m (50-ft) buffers on all sides of a perennial streambed, spring, seep, wetland, or any riparian-like area where no disturbance would occur. This enhances stability of any potential watercourse. If the gas line passes under the streambed, depending on the degree of disturbance, stabilization and revegetation of the streambed may be necessary.

Best management practices would be employed when working in canyon bottoms as a planned part of the project since these areas are considered potentially contaminated until proven otherwise through extensive further contaminant testing. Minimizing soil disturbance and contaminant movement is desired. Following the already prescribed method (CSFS 1998, Marsh 2001, DOE 2000) of using established roads only in canyon bottoms will help with this issue.

7.0 Conclusion

No potential loss of life or property have been identified with respect to the floodplains and wetlands for the proposed gas line project. Concerns about siltation, erosion, and excessive storm water runoff will be addressed with specific mitigation implemented as part of careful project planning. Although there may be some effect to floodplains and wetlands, the potential impacts from the LAGL project are expected to be minor.

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